

GLOSSARY

Abrasion: A condition manifested in pavement markings by more or less gradual surface erosion, thinning, and disappearance of the film due to wind, water, sand, and vehicle tire wear.

Acrylic: Any of a class of transparent, thermosetting plastics or resins made from acrylic acid.

Air Atomizing Spray: Spray atomization of a liquid compound accomplished through supplied air pressure only.

Airless Spray: Spray atomization of the liquid compound accomplished through hydraulic fluid pressure only. No atomizing air is used.

Aliphatic Solvent: Solvents, such as mineral spirits and heptane, used in thinning paints.

Alkyd: Synthetic resin used as a bonding agent in paints and lacquers.

Ambient Pavement Temperature: Temperature of the pavement. (May or may not be the same as ambient air temperature.)

Applied Line: Pavement marking material in place on the substrate.

Asphaltic Concrete (AC): A dense-graded pavement made of hot mineral aggregates plant-mixed with hot asphalt.

Average Daily Traffic (ADT): The number of vehicles that pass over a roadway on an average day. Usually calculated by counting the number of vehicles that pass over a roadway for a longer period of time, such as a year, and then dividing by the number of days in that period. For this reason, ADT is also often referred to as Average Annual Daily Traffic (AADT).

Aromatic Solvents: Solvents, such as xylol and toluene, used in thinning traffic paints.

Binder: In painted markings, the binder is the hard base material that is left on the road after the solvent has evaporated. Common paint binders are alkyd resins and chlorinated rubber materials. In thermoplastic markings, the binder is the actual thermoplastic material that melts when heated and hardens into the film that is left on the road. Binders are also often referred to as the base material or base vehicle.

Bituminous Concrete: A more general term than asphaltic concrete, this term may refer to asphaltic concrete that employs hot asphalt or other similar mixtures using refined tar. The coarse aggregate is usually crushed stone, crushed slag, or crushed gravel.

Bisymmetric: Having double symmetry, i.e. in floating bead context. It means that the bead surface embedded in the paint is symmetrical with the exposed surface.

Bleeding: Conditions in which asphalt substrate is softened, due to heat or solvents, causing the oils to rise to the surface and producing black spots in the marking material.

Bond: Adhesive quality of a coating to a substrate.

Brightness: Brightness is the term that refers to human perception of luminance. Whereas luminance is a photometrically measured quantity, brightness describes how intense a light source or lighted surface appears to the human eye.

Broken Line: A pavement marking consisting of a cycle of marking segments and gaps. Broken lines are permissive; drivers are being informed that they are permitted to cross a broken line. Also referred to as a skip line.

Candela: The basic unit for optical quantities, the candela is a measure of luminous intensity. One candela is defined as the luminous intensity in a given direction of a source emitting a monochromatic radiation of frequency 540×10^{12} Hertz, the radiant intensity of which in that direction is 1/683 watts per steradian.

Centerline: A yellow marking indicating the division of the roadway between traffic traveling in opposite directions.

Ceramic: Baked clay.

Chemical Composition Specification: A specification written for pavement marking material that describes what components and what percentage of each component are to be used in the formulation.

Chevron Alignment Sign: A warning sign used to delineate sharp roadway alignment changes.

Chipping: The breaking away of small fragments of the pavement marking from the substrate.

Chlorinated Rubber: Hard resin that speeds up drying of varnish or alkyd paints; dries by solvent evaporation only.

Coefficient of Luminous Intensity (R_l): The ratio of the luminous intensity (I) of a retroreflector in the direction of observation to the illuminance E_l at the retroreflector on a plane perpendicular to the direction of the incident light, expressed in candelas per lux.

Coefficient of Retroreflected Luminance (R_L): A measure of retroreflection most often used to describe the retroreflectivity of pavement markings. Coefficient of retroreflected luminance is defined as the coefficient of luminous intensity per unit area.

Coefficient of Retroreflection (R_A): A measure of retroreflection used more often to refer to the retroreflectivity of highway signs. Coefficient of retroreflection is defined as the ratio of the coefficient of luminous intensity (R_l) of a plane retroreflecting surface to its area (A), expressed in candelas per lux per square meter.

Cold-Applied Thermoplastic: Preformed tapes composed of thermoplastic materials. Applied to the pavement using an adhesive.

Conspicuity: A measure of the likelihood that a driver will notice a certain target at a given distance against a certain background.

Contrast: The ratio of luminance from a target to the luminance from the target's surroundings.

Cost-Effectiveness: A ratio of a delineation device's service life to the total costs it incurs over its service life.

Crosswalk Marking: Markings at intersections that serve primarily to guide pedestrians along the proper paths through the intersection.

Curb Marking: A marking used to delineate the location of a curb.

Curing: Commonly identified as the hydraulic hardening of PCC. It also refers to the hardening of pavement marking materials.

Curve Sign: A warning sign used to inform drivers of an upcoming change in roadway alignment where the recommended speed is greater than 30 miles per hour and equal to or less than the posted speed limit.

Curing Compound: A coating material applied to freshly placed PCC to retain moisture in the concrete.

Delineation: One, or a combination of several types of devices (excluding guide signs) that regulate, warn, or provide tracking information and guidance to the driver.

Dense-Graded: Refers to a type of pavement that makes use of a coarse aggregate, such as crushed stone or gravel, mixed with particles of a finer material, such as sand, to create a smooth, dense pavement surface. See also, Open-Graded.

Discretionary: Refers to making a choice from a number of alternatives.

Double Line: A pavement marking used on two-way undivided roadways to inform the driver of a no-passing zone in both directions of travel.

Dry Film Thickness: Thickness of line when dry and without glass beads.

Durability: A measure of traffic line's resistance to the wear and deterioration associated with abrasion and chipping. For standard methods of evaluation of durability, refer to the ASTM Bulletins D913 for Chipping and D821 for Abrasion (erosion).

Duty: An obligation to conduct oneself in a way that will protect others from unreasonable risks.

Edgeline: A line that indicates the edge of the roadway.

Edge Loss: A loss of pavement marking material at the edge of a marking that does not go all the way across the face of the marking.

End Loss: A loss of pavement marking material at the end of a marking.

Entrance Angle (or Incidence Angle): The angle between the light source and a line normal to the retroreflector surface.

Epoxy: Bonding of different atoms to form durable epoxy resins used in adhesives and varnishes.

Exothermic: Refers to a chemical reaction in which heat is produced.

Film Integrity: The properties of a film that result in the film's ability to resist scuffing, marring, etc.; cohesive strength.

Flotation Bead: A retroreflective glass bead coated with a special chemical substance so that it will float to half of its diameter in a pavement marking.

Flux: The rate of transfer of fluid, particles or energy across a given surface.

Footcandle: The English system's unit of illuminance, one footcandle is the illuminance on a surface that is everywhere one foot from a uniform point source of light of one candle and equal to one lumen per square foot. One footcandle equals 10.76 lux.

Gap-to-Segment Ratio: The ratio of the length of the gap in a broken line to the length of the marking segment.

Glass Beads: Spheres used in conjunction with binder to produce retroreflectivity in pavement markings:

- (a) Conventional-Glass composition with approximate refractive index of 1.52 with no surface treatment.
- (b) Low refractive index-Spheres with refractive index between 1.50 and 1.64.
- (c) Medium refractive index-Spheres with refractive index between 1.65 and 1.89.
- (d) High refractive index-Spheres with refractive index greater than 1.89.
- (e) Plastic-Spheres manufactured from organic materials
- (f) Glass-Spheres manufactured from a soda lime glass material.
- (g) Premix-Spheres dispersed in the binder prior to application.
- (h) Drop-on-Spheres applied to a pavement marking after the material has been applied to the pavement.
- (i) Moisture resistant (moistureproof)-Spheres treated to reduce conglomeration in the bead dispenser.
- (j) Floating-Spheres treated to control depth to which they will sink into the binder.
- (k) Static charge-Force tending to cause erratic flow of beads caused by attraction between unlike-charged beads and repulsion between like-charged beads.
- (l) Retroreflective-Spheres that return light along a path parallel to the entrance path.
- (m) Observation angle-Angle formed by a line extending from the light source to a point on the retroreflector and a line extending from the eye to the same point

- on the retroreflector (light-sign-eye angle). Brightness is maximum when observation angle is zero.
- (n) **Entrance angle**-Angle formed by a line extending from the light source to a point on the retroreflector and a line forming a 90-degree angle with the retroreflector at the same point.

Gradation: A measure of the sizing of an application of glass beads. The two variables are the overall range of sizes and the percentage by weight of each size.

Gravity Extrusion: A method of applying a pavement marking material that uses gravity to force the material out of a specifically sized die.

Guideline: A premarking applied to the pavement to guide the operator of a striper in applying the final pavement markings.

Heat Exchanger: A device used to transfer heat from the hot heat transfer fluid to the cold product prior to spraying. It generally consists of multiple lines passing product through the heat transfer fluid-filled line.

Heat Transfer Fluid: Fluid capable of reaching high temperature and transferring much of its heat by means of conduction to the cold product.

Hot-Applied Thermoplastic: Thermoplastic materials that are melted to liquid form at about 425 degrees Fahrenheit (218 degrees Celsius) and applied to the pavement using an extrusion of spray technique.

Hydrocarbon: A class of thermoplastic materials based on organic petroleum compounds.

Illuminance: Luminous flux incident per unit of area.

Index of Refraction: For a given material, the index of refraction is equal to the ratio of the speed of light in a vacuum to the speed of light as it travels through the material. Describes the "light bending" property of a glass as the light wave passes from the air to glass or vice versa. It is a measure of the brilliance of retroreflectivity for glass spheres.

Inlay Installation: A method of applying preformed tapes to newly applied asphaltic concrete that embeds the tape into the pavement.

Interior Loss: Any loss of pavement marking material that does not reach any of the edges of the marking.

Lane Line: A line separating two lanes of traffic traveling in the same direction.

Legibility: Legibility of a delineation device is the likelihood that a driver will understand the message that the delineation device is meant to convey.

Liability: The legal obligation of a negligent party to pay victims for damages resulting from the party's negligence.

Large Arrow Sign: A warning sign intended to inform drivers of a sharp change in roadway alignment.

Liquid Heater: A device used to heat transfer fluid to its required temperature before it enters the heat exchanger.

Longitudinal: Running lengthwise; placed lengthwise; opposite of transverse.

Lumen: The metric unit of luminous flux, 1 lumen is equal to the luminous flux emitted within one steradian by a point source having a spatially uniform luminous intensity of 1 candela.

Luminance: The luminous flux in a light ray, emanating from a surface or falling on a surface, in a given direction, per unit of projected area of the surface as viewed from that direction, per unit of solid angle.

Luminance Contrast: See contrast.

Luminous Intensity: Light flux per unit solid angle.

Lux: The metric unit of illuminance, 1 lux is equal to the illuminance corresponding to a luminous flux density of one lumen per square meter.

Manual on Uniform Traffic Control Devices (MUTCD): A Federal Highway Administration publication intended to standardize traffic control devices throughout the nation.

Methyl Methacrylate: A two-component pavement marking material similar to epoxy materials.

Mil: Unit of length equivalent to 0.001 inches.

Ministerial: Refers to mandatory tasks that involve a minimum of personal judgment.

Negative Delineation: Provides information to vehicle driver on where not to go.

Negligence: The omission to do something that a reasonable person would ordinarily do, or the doing of something that a reasonable person ordinarily would not do.

No-Track Time: The time required for the applied marking to resist being picked up by vehicle tires and transferred to the adjacent pavement.

Observation Angle: The angle at the retroreflector position between the observer's eye and the light source.

Older Driver: A driver aged 55 years or older.

Oleoresinous: Refers to a type of paint binder that is composed of some type of essential oil, mixed with either a natural or synthetic resin.

Open-Graded: Refers to a type of pavement in which only a coarse aggregate is mixed with hot asphalt to create a pavement with a rough surface texture. This type of pavement has a high porosity and permeability, reducing the incidence of water ponding. See also, Dense-Graded.

Orbitrol Control: A brand name device, located at the base of the platform operator's steering columns and powered by a hydraulic mechanism, which acts as a power steering unit for control of the outriggers.

Orientation Angle (Rotation Angle): This is related to rotation of the retroreflective unit in its own plane or the plane normal to the line of observation.

Outrigger: A mechanism, powered by hydraulic action, that extends and supports the outrigger carriages, which, in turn, support the spray guns.

Overlay Installation: A method of installation of a preformed pavement marking tape that merely uses adhesive to bond the tape to the surface of the pavement.

Overspray: Spray pattern exceeding the desired pattern; e.g., spraying of product in a fine mist beyond the proposed edges of the line being marked.

Paints: Classified by, among other things, drying times:

- (a) Instant dry-less than 30-second no-track time
- (b) Quick dry-30- to 120-second no-track time
- (c) Fast dry-2- to 7-minute no-track time
- (d) Conventional-over 7-minute no-track time

Parking Space Marking: Markings intended to inform drivers where they are permitted to park.

Pavement: The physical surface of the roadway.

Pavement Marking: A colored marking applied to the pavement to provide drivers with roadway alignment information.

Performance Specification: A specification written to describe pavement marking materials based on their performance.

Permissive: Refers to areas where a driver is permitted to travel.

Phenolics (Resins): A large class of synthetic plastics made from aldehydephenol base.

Pigment: White or yellow material in a pavement marking that provides the marking with its color and also provides the necessary diffuse reflection at the back of the glass beads in a pavement marking to create retroreflectivity.

Plastic: Anything moldable; any material, natural or synthetic, which may be fabricated into a variety of shapes by application of heat or pressure.

Polyester (Polyethylene): Tough, flexible thermoplastic resin made by polymerization of ethylene and used in making moisture-proof plastics.

Portland Cement Concrete (PCC): A pavement material composed of Portland cement, sand, coarse aggregate, and water. This material is smoother and longer-lasting than bituminous concrete.

Positive Delineation: Provides information as to where vehicle driver is permitted to drive.

Post-Mounted Delineator: A delineation device that consists of retroreflective material mounted on a four-foot post to provide long-range information on roadway alignment.

Preformed Tape: A pavement marking material that is made of preformed thermoplastic material. It is applied to the pavement cold, employing a self-adhesive backing material, or it is applied with a separate adhesive.

Premix: A paint that contains glass beads held in suspension throughout the paint,

Pretreatment: Preparation of a pavement surface for installation of delineation devices, Usually consists of cleaning and/or priming.

Preview Distance: The distance that the delineation provides the driver to see upcoming changes in roadway alignment.

Prismatic Cube-Corner Marker: A raised pavement marker that employs prismatic cube-corner elements to achieve retroreflection.

Psychophysical Parameter: A limitation in the driver's ability to assimilate roadway information.

Railroad Crossing Marking: A pavement marking symbol that consists of two "R"s and an "X," which informs drivers of an upcoming intersection with a set of railroad tracks.

Raised Pavement Marker (RPM): A ceramic or plastic marking device placed on the road to substitute for or act as a supplement to standard pavement markings. Raised pavement markers are comprised of a variety of configurations including retroreflective and nonretroreflective markers, and markers that employ prismatic retroreflection and those that employ spherical retroreflection.

Reasonable Person: A concept used in legal circles to establish what actions, or lack of actions, are considered to be negligent. The concept applies a test of what a reasonably prudent person, in the eyes of the jury, would do in a particular situation to determine if a certain party has been negligent.

Refractive Index (RI): See index of refraction.

Reflective: Bending or turning light.

Resin: Substance made by chemical synthesis, especially those used in the making of plastics.

Restrictive: Refers to areas where a driver is not permitted to travel.

Retroreflective: Capable of returning light to its source.

Ribbon Extrusion: A method of applying pavement markings whereby the material is forced onto the pavement under pressure.

Roadway: A term used to refer to the paved paths that drivers use for transportation. Refers to the transportation system in a more macroscopic way than “pavement” or “substrate.”

Service Life: The time required for a pavement marking to become ineffective due to its having lost its luster, lost its retroreflectivity, or having been worn completely from the pavement.

Sieve Size: The sieve size refers to the sizing or mesh of a sieve or screen used to determine size of glass beads. The larger the U.S. Mesh number, the more threads there are and the smaller the openings are.

Silica: Silicon dioxide is one of the major oxide constituents of glass used for manufacturing glass beads.

Skinning: A condition commonly occurring with paints in the container and when applied as a line or strip where the immediate surface dries first or “skins” and the under surface remains wet (as opposed to through set of a film).

Solid Angle: The three-dimensional angular spread at the vertex of a cone measured by the cone on a unit sphere whose center is the vertex of the cone.

Solid Line: A continuous pavement marking. Solid lines are restrictive; drivers are being informed that they are not to cross a solid line.

Solvent: Usually a liquid that, when added to paint, will reduce the viscosity of the paint and may also dissolve the resin (binder).

Specific Intensity per Unit Area (SIA): See **Coefficient of Retroreflection**.

Speed Measurement Marking: A transverse pavement marking intended to aid law enforcement officers in measuring the speeds of vehicles.

Spotting: A technique for premarking pavement at predetermined intervals to guide the operator of the striping machine when applying permanent pavement markings.

Spraying: A procedure for applying marking material to a surface:

- (a) Air atomizing spray-Spraying atomization of the liquid paint through air pressure only.
- (b) Airless spray-Spraying atomization of the liquid paint is accomplished through hydraulic fluid pressure only. No atomization air is used.

Staining: The obscuration of thermoplastic pavement markings due to the combined effects of tire rubber, oil, and other contaminants.

Standard of Care: A certain level of consideration that one party owes as a legal duty to another party. The standard of care sets the boundaries of a party's liability.

Steradian: The unit by which solid angles are measured. There are 4π steradians in a complete sphere.

Stop Bar: A pavement marking applied at an intersection to inform drivers where they should stop.

Striper: A self-contained marking system mounted on a truck chassis and used on the road to apply pavement markings.

Substrate: The surface to which the marking material is applied.

Surface: Refers to the top of the pavement material or substrate-the area where pavement markings are applied.

Sulky: A mechanism consisting of a guide wheel and its support structure, attached to the front of a truck-mounted striper, intended to guide the striper operator in applying the markings in the proper lateral location.

Symbol Marking: A pavement marking used in a specific location to guide, warn, regulate, or inform drivers where standard pavement markings are not sufficient.

Technique: Refers to the methods chosen to accomplish effective delineation. Selection of an appropriate marking material and method of application are part of delineation technique.

Temporary Pavement Marking: Pavement markings to be used for a period of less than two weeks.

Thermoplastic: A class of pavement marking materials whose main component is a plastic material that becomes pliable or liquid at high temperatures.

Threshold Contrast: The minimum difference in luminance of a target and luminance of that target's background at which the target is visible.

Through Set: Property of a marking material to be uniformly dry or set through its entire thickness from the line surface to the substrate surface (as opposed to skinning).

Tip Life: The length of time that a spray gun tip will continue to function properly. The tip is no longer useful when the orifice elongates and the applied marking deviates from its desired appearance.

Tort: A civil wrong, other than breach of contract, for which a court of law will provide a remedy in the form of an action for money damages.

Traffic Control Device: A device intended to provide for the orderly and predictable movement of traffic and to provide such guidance and warnings as are needed for the safe and informed operation of individual elements of the traffic stream.

Traffic Paint: A pavement marking material that consists mainly of a binder and a solvent. The material is kept in liquid form by the solvent, which evaporates upon installation to the pavement, leaving the binder to form a hard film.

Transverse: Lying, situated, placed across from side-to-side; crosswise. Also, perpendicular to the center line.

Treatment: Refers to the higher-level decision process of designing delineation to be installed. Such issues as use of raised pavement markers and post-mounted delineators are part of delineation treatment.

Turn Sign: A warning sign used to inform drivers of an upcoming change in roadway alignment where the recommended speed is less than 30 miles per hour and equal to or less than the posted speed limit.

Viscosity: A measure of a fluid's tendency to resist flow. Also, the constant ratio of the shearing stress to the rate of shear in the liquid.

Volatile Organic Compound (VOC): An environmentally hazardous material that is released into the atmosphere during many marking operations, especially those that employ chemical solvents, such as alkyd traffic paints.

Warning Sign: Signs used to supplement roadway markings where those markings are not considered adequate to convey all necessary information to the driver.

Water-Based Paint: A pavement marking material that employs water as a solvent, thus nullifying the environmental concerns with many traffic paints. Also referred to as latex paint.

Wet Film Thickness: Thickness of a pavement marking at the time of application without glass beads.

Wetting: A prime requisite for good adhesion, it is the flow of liquid pavement marking over the surface of the substrate to yield complete coverage. Wetting, and hence adhesion, is poor over dirty or oily surfaces.

Wide Line: A line wider than the standard 4-inch width.